

1 This listing of claims will replace all prior versions, and listings, of claims  
2 in the application:

3  
4 **Listing of Claims**

5  
6 Claim 1 (Original): A system comprising:  
7 a network server, to provide media content on request through a wireline  
8 network;  
9 a wireless host, to request media content through a wireless network; and  
10 a network gateway, coupled to each of the server and the wireless host, to  
11 establish a communication channel from the server to the wireless host through  
12 both the wireline network and the wireless network, wherein the communication  
13 channel includes a transport layer protocol with control parameters for each of the  
14 wireline network and the wireless network.

15  
16 Claim 2 (Original): A system according to claim 1, wherein the  
17 transport layer protocol of the communication channel enables the network  
18 gateway to distinguish transmission problems occurring within either network  
19 component of the communication channel.

20  
21 Claim 3 (Original): A system according to claim 1, wherein the  
22 network server comprising:  
23 a transmission rate controller to receive media content from an application  
24 and control transmission over the wireline network; and  
25

1 a congestion controller, to receive congestion control indications from the  
2 network gateway in the transport protocol, estimate the available bandwidth over  
3 the network, and to instruct the transmission rate controller to adjust the  
4 transmission rate accordingly.

5  
6 Claim 4 (Original): A system according to claim 1, the network server  
7 further comprising:

8 an application error control interface, to receive a bit-error rate (BER)  
9 control parameter from the network gateway via the transport protocol denoting  
10 the bit-error rate (BER) experienced at the wireless host; and

11 a partial checksum generator, responsive to the application error control  
12 interface, to generate checksum of a dynamically selected amount of the requested  
13 content for inclusion in at least a subset of transmitted frames for error control  
14 purposes based, at least in part, on the received BER control parameter.

15  
16 Claim 5 (Original): A system according to claim 4, wherein the partial  
17 checksum generator includes more data in the partial checksum when the BER  
18 increases, less data when the BER decreases.

19  
20 Claim 6 (Original): A system according to claim 1, the wireless host  
21 comprising:

22 a fading timeout monitor, to identify degradation in transmission quality in  
23 the wireless network component resulting from fading and/or multipath conditions,  
24 and to issue a fading condition control parameter to the network gateway via the  
25 transport layer protocol.

1  
2 Claim 7 (Original): A system according to claim 6, wherein the fading  
3 condition control parameter includes an indication to the network gateway of what  
4 frame to commence retransmission of content lost due to fading and/or multipath.

5  
6 Claim 8 (Original): A system according to claim 1, the wireless host  
7 comprising:

8 a header analyzer, to analyze at least a partial checksum in a header of a  
9 received frame of media content to determine whether an accurate frame was  
10 received; and

11 a bit-error rate (BER) controller, coupled to the header analyzer, to generate  
12 a BER control parameter for the network gateway via the transport layer protocol  
13 denoting a running average of accurately received frames.

14  
15 Claim 9 (Original): A system according to claim 1, the network  
16 gateway comprising:

17 a congestion monitor, to monitor congestion of the communication channel,  
18 and to issue a congestion control parameter to the network server via the transport  
19 layer protocol.

20  
21 Claim 10 (Original): A system according to claim 1, the network  
22 gateway comprising:

23 a buffer, to receive frames of media content from the network server via the  
24 wireline network component of the communication channel, and to selectively  
25

1 provide frames of the received media content to the wireless host via the wireless  
2 network component of the communication channel.

3  
4 Claim 11 (Original): A system according to claim 10, the network  
5 gateway further comprising:

6 a weighted scheduling module, coupled to the buffer, to schedule delivery  
7 of media content from the buffer to the wireless host based on their priority.

8  
9 Claim 12 (Original): A system according to claim 10, the network  
10 gateway further comprising:

11 one or more retransmission modules, coupled to the buffer, to receive one  
12 or more of a negative acknowledgment (NACK) control parameter and/or a fading  
13 control parameter and determine whether the requested retransmission of one or  
14 more frames can be accommodated.

15  
16 Claim 13 (Original): A system according to claim 12, wherein the one or  
17 more retransmission modules determine whether the requested retransmission may  
18 occur by determining whether a start frame, identified within the received control  
19 parameter, is available within the buffer.

20  
21 Claim 14 (Original): A system according to claim 1, wherein the  
22 transport layer protocol comprises:

23 a congestion control parameter, generated by the network gateway in  
24 response to congestion detected along the communication channel.

25

1 Claim 15 (Original): A system according to claim 14, wherein the  
2 congestion control parameter is sent to the server for purposes of throttling  
3 transmission of the media content.

4  
5 Claim 16 (Original): A system according to claim 1, wherein the  
6 transport layer protocol comprises:

7 a fading control parameter, generated by a wireless host to provide an  
8 indication to the network gateway that the wireless host has just concluded a  
9 period of fading.

10  
11 Claim 17 (Original): A system according to claim 16, wherein the  
12 network gateway retransmits one or more frames of media content commencing at  
13 a frame denoted by a received fading control parameter.

14  
15 Claim 18 (Original): A system according to claim 1, wherein the  
16 transport layer protocol comprises:

17 a negative acknowledgment (NACK) control parameter, generated by the  
18 wireless host to denote one or more frames of media content received with an  
19 unacceptably high bit-error rate (BER).

20  
21 Claim 19 (Original): A method comprising:  
22 receiving a request from a wireless host for content available from a  
23 network server;

24  
25

1 establishing a communication channel to service the request between the  
2 wireless host and the network server over a wireless network and a wireline  
3 network coupled to the server; and

4 adjusting transmission characteristics in one or more of the wireline  
5 network and/or the wireless network to improve transmission quality based, at  
6 least in part, on one or more control parameters of a transport layer protocol of the  
7 communication channel which distinguish wireline transmission problems from  
8 wireless transmission problems.

9  
10 Claim 20 (Original): A method according to claim 19, wherein the  
11 transport layer protocol includes a control parameter to denote congestion in the  
12 communication channel.

13  
14 Claim 21 (Original): A method according to claim 20, further  
15 comprising:

16 instructing a server of the requested content to reduce transmission rate to  
17 alleviate congestion identified in the wired network component in response to  
18 receiving a congestion control parameter.

19  
20 Claim 22 (Original): A method according to claim 19, wherein the  
21 transport layer protocol includes a control parameter to denote a fading condition  
22 in a wireless network component of the communication channel.

23  
24 Claim 23 (Original): A method according to claim 22, further  
25 comprising:

1 calculating a delay measure when a fading condition control parameter is  
2 received; and

3 retransmitting content from a buffer to the wireless host starting at a frame  
4 denoted by the fading condition control parameter if the delay measure does not  
5 exceed a threshold.

6  
7 Claim 24 (Original): A method according to claim 23, wherein  
8 calculating the delay measure comprises:

9 identifying the start time of the frame denoted in the fading condition  
10 control parameter; and

11 subtracting the start time from the current project time to quantitatively  
12 measure what kind of delay would be incurred by retransmitting frames lost during  
13 the fading condition.

14  
15 Claim 25 (Original): A method according to claim 19, wherein the  
16 transport layer protocol includes a negative acknowledgment (NACK) control  
17 parameter to denote that a frame was dropped due to a high bit-error rate (BER)  
18 condition.

19  
20 Claim 26 (Original): A method according to claim 25, further  
21 comprising:

22 identifying whether the frame denoted in the NACK control parameter is  
23 still available in a buffer of received media content;

24 calculating a delay measure when a NACK control parameter is received;  
25 and

1 retransmitting the frame from the buffer to the wireless host if it is  
2 identified within the buffer;

3 the delay measure not exceeding a threshold.

4  
5 Claim 27 (Original): A method according to claim 25, wherein  
6 calculating the delay measure comprises:

7 identifying the start time of the frame denoted in the NACK control  
8 parameter; and

9 subtracting the start time from the current project time to quantitatively  
10 measure what kind of delay would be incurred by retransmitting the lost frames.

11  
12 Claim 28 (Original): A computer-readable medium having computer-  
13 executable instructions that, when executed by a computer, performs the method as  
14 recited in claim 19.

15  
16 Claim 29 (Original): A computer comprising one or more computer-  
17 readable media having computer-executable instructions that, when executed by  
18 the computer, perform the method as recited in claim 19.

19  
20 Claim 30 (Original): A transport layer protocol to facilitate streaming of  
21 media content across heterogeneous networks, the protocol comprising:

22 a congestion parameter, which provides a receiving network element with  
23 an measure of congestion incurred in transmission within the network;

24

25

1 a fading parameter which, when asserted, provides a receiving network  
2 element with an indication that a communicatively coupled wireless host just  
3 emerged from a fading condition; and

4 a BER parameter, which provides a receiving network element with an  
5 measure of bit error rate incurred in transmission within a wireless network.  
6

7 Claim 31 (Original): A computer comprising a sender of the protocol as  
8 recited in claim 30.  
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10 Claim 32 (Original): A computer comprising a receiver of the protocol  
11 as recited in claim 30.  
12

13 Claim 33 (Original): A transport layer protocol to facilitate streaming of  
14 media content across heterogeneous networks, the protocol generated in  
15 accordance with the following acts:

16 providing a server computer in a communications with a communications  
17 network;

18 receiving data using the protocol by way of the communications network,  
19 the protocol comprising:

20 a congestion parameter, which provides a receiving network element with  
21 an measure of congestion incurred in transmission within the network;

22 a fading parameter which, when asserted, provides a receiving network  
23 element with an indication that a communicatively coupled wireless host just  
24 emerged from a fading condition; and  
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1 a BER parameter, which provides a receiving network element with an  
2 measure of bit error rate incurred in transmission within a wireless network.  
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